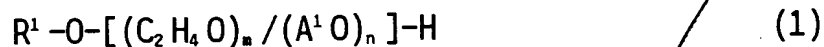


WHAT IS CLAIMED AS NEW AND DESIRED TO BE SECURED BY LETTERS PATENT IS:

*Suba*  
1. An assistant for digesting a lignocellulose material, which comprises a nonionic surfactant (A) comprising one or more compounds represented by the general formula (1):

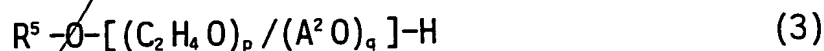


wherein  $R^1$  is a branched alkyl group containing 4-24 carbon atoms represented by the general formula (2):



(wherein  $R^2$  and  $R^3$  are independently selected from the group consisting of straight-chain or branched alkyl groups containing 1-21 carbon atoms, and  $R^4$  is an alkylene group containing 1-21 carbon atoms);  $m$  is an integer of at least 1, having an average of 4-20;  $A^1$  is an alkylene group containing 3 or 4 carbon atoms; and  $n$  is 0 or an integer of at least 1, having an average of 0-15; wherein  $(C_2H_4O)$  and  $(A^1O)$ , in case of the average of  $n$  being 1-15, are linked random-wise and/or block-wise.

2. An assistant for digesting for a lignocellulose material, which comprises a nonionic surfactant (B) obtained by addition of an alkylene oxide to an aliphatic alcohol, said nonionic surfactant (B) comprising one or more compounds represented by the general formula (3):



wherein  $R^5$  is a straight-chain, branched or cyclic aliphatic hydrocarbyl group containing 4-24 carbon atoms;  $p$  is an addition molar

09926709-120501

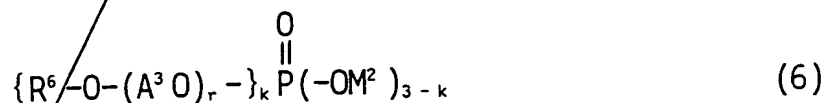
number of 4-20; A<sup>2</sup> is an alkylene group containing 3 or 4 carbon atoms; and q is an addition molar number of 0 or 1-15; wherein (C<sub>2</sub>H<sub>4</sub>O) and (A<sup>1</sup>O), in case of the average of q being 1-15, are linked random-wise and/or block-wise; said nonionic surfactant (B) having a weight-average molecular weight (M<sub>w</sub>) and a number-average molecular weight (M<sub>n</sub>) providing a ratio of M<sub>w</sub>/M<sub>n</sub> satisfying the relationship (4):

$$M_w/M_n \leq -0.183 \times K^{-0.930} \times \ln X + 1.327 \times K^{-0.065} \quad (4)$$

wherein LnX is a natural logarithm of X; X is an average addition molar number of the alkylene oxide per 1 mole of the aliphatic alcohol; and K is the number of carbon atoms in R<sup>5</sup> of the general formula (3).

3. The assistant of Caime 1 or 2, wherein said nonionic surfactant (A) or said nonionic surfactant (B) has an HLB of 6-18.

4. An assistant for digesting a lignocellulose material, which comprises an anionic surfactant (C) represented by the general formula (5) and/or an anionic surfactant (D) comprising one or more compounds represented by the general formula (6):



wherein R<sup>6</sup> is a straight-chain, branched or cyclic aliphatic hydrocarbyl group containing 4-24 carbon atoms; A<sup>3</sup> is an alkylene group containing 3 or 4 carbon atoms; r is 0 or an integer of at least 1, having an average of 0-15; k is an integer of 1 or 2; and M<sup>1</sup> and M<sup>2</sup> are monovalent cations.

5. An assistant for digesting a lignocellulose material, which

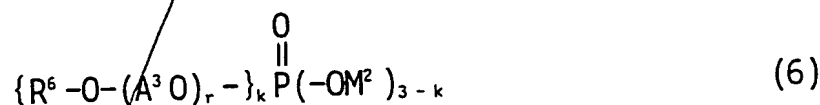
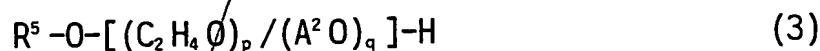
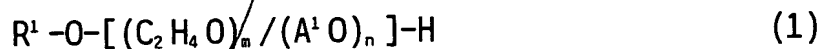
comprises:

(a) a nonionic surfactant (A) and/or a nonionic surfactant (B); together with

(b) at least one anionic surfactant selected from the group consisting of an anionic surfactant (C), an anionic surfactant (D) and an anionic surfactant (E);

in a weight ratio of 100/0.1 - 100/30;

said nonionic surfactant (A) comprising one or more compounds represented by the general formula (1); said nonionic surfactant (B) being obtained by addition of an alkylene oxide to an aliphatic alcohol, and comprising one or more compounds represented by the general formula (3) and having a weight-average molecular weight (Mw) and a number-average molecular weight (Mn) providing a ratio of Mw/Mn satisfying the relationship (4); said anionic surfactant (C) comprising one or more compounds represented by the general formula (5); said anionic surfactant (D) comprising one or more compounds represented by the general formula (6); and said anionic surfactant (E) comprising one or more compounds represented by the general formula(7):



Suba



wherein  $R^1$  is a branched alkyl group containing 4-24 carbon atoms represented by the general formula (2):



(wherein  $R^2$  and  $R^3$  are independently selected from the group consisting of straight-chain or branched alkyl groups containing 1-21 carbon atoms, and  $R^4$  is an alkylene group containing 1-21 carbon atoms);  $R^5$  and  $R^6$  are straight-chain, branched or cyclic aliphatic hydrocarbyl groups containing 4-24 carbon atoms;  $R^7$  is a straight-chain or branched alkyl group, alkenyl group, or mono- or di-hydroxyalkyl group, containing 4-24 carbon atoms;  $R^8$  is an alkylene group containing 1-6 carbon atoms;  $m$  is an integer of at least 1, having an average of 4-20;  $p$  is a number of 4-20;  $A^1$ ,  $A^2$ ,  $A^3$  and  $A^4$  are alkylene groups containing 3 or 4 carbon atoms;  $n$ ,  $r$  and  $s$  are 0 or an integer of at least 1, having an average of 0-15;  $q$  is an addition molar number of 0 or 1-15;  $k$  is an integer of 1 or 2;  $M^1$ ,  $M^2$  and  $M^3$  are monovalent cations; wherein  $(C_2H_4O)$  and  $(A^1O)$ , in case of the average of  $n$  or  $q$  being 1-15, are linked random-wise and/or block-wise;

$$Mw/Mn \leq -0.183 \times K^{-0.930} \times \ln X + 1.327 \times K^{-0.065} \quad (4)$$

wherein  $\ln X$  is a natural logarithm of  $X$ ;  $X$  is an average addition molar number of the alkylene oxide per 1 mole of the aliphatic alcohol; and  $K$  is the number of carbon atoms in  $R^5$  of the general formula (3).

6. The assistant of any one of Claims 1-5, which is used in

*Sub a* combination with a quinone type digestion assistant and/or a polysulfide.

7. A method for producing a pulp, which comprises digesting a lignocellulose material with an alkali or a sulfite in the presence of a digestion assistant; wherein an assistant (a) according to any one of Claims 1-6 is used as the assistant.

8. A method for producing a pulp, which comprises digesting a lignocellulose material with an alkali or a sulfite in the presence of a digestion assistant; wherein an assistant (a) according to any one of Claims 1-5 is used together with a quinone type digestion assistant and/or a polysulfide as the assistant.

9. The method of Claim 8, wherein the assistant (a) is added beforehand prior to addition of the quinone type digestion assistant and/or the polysulfide, and after their addition, digesting is carried out.

10. The method of Claim 9, wherein the lignocellulose material is heated after, during and/or before addition of the assistant (a).

*add a<sup>2</sup>*